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## Avid mechanical disc brakes

Cable-operated discs have a bit of a bad reputation, but that's about to change, thanks to Avid. This cable-operated disc has one feature which many don't. It's not the simple mounting system which does away with shims and allows a simple three-minute install. It's not the easy-to-change pads. Or the quality brake pad friction material. The feature the Avids have above all other cable-operated discs we've tested is performance. Yes, at long last there is a cable-operated disc which works well enough to rival even some hydraulic disc brakes.

Price when tested: £

 Reviewed:  
 11/3/2000


The brakes come complete with a set of Avid's Straight Jacket brake cables. Once fitted we hooked the brakes up to a set of Shimano XT V-brake levers and rode off. Initially they performed well, although without much real bite. After a couple of hours of regular riding, however, they increased in power, and by the end of the ride we were contemplating the benefits of budget hydraulic systems.

### MBUK VERDICT

A cable-operated disc brake which works



### WHAT THE RATINGS MEAN

- 5** Fantastic, essential, don't be without it
- 4** Damn good, but not quite great
- 3** Doesn't excel but doesn't suck either
- 2** Suffers from some serious drawbacks

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- ☐ Ride my bike
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- ☐ Fart or belch
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## Exhibit B

Exhibit B - 10/10/10

**GEARHEAD**

# Affordable Disc Brakes

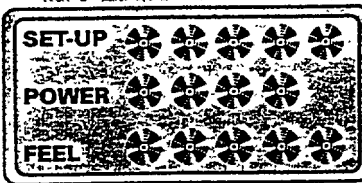
**Five Brakes that won't break the bank**

GETTING TIRED OF ALL THIS DISC BRAKE hoopla? Well, we hate to break the news to you, but the hype isn't bound to stop anytime soon. When the dust settles, one truth remains: even mediocre disc brakes beat the living snot out of the best V-brakes in

wet weather slop and grime. And when it comes to raw stopping power, disc brakes almost always come out the winner. We're not going to lie to you—you can get by just fine with your V-brakes. You don't have to join the rush to bolt on discs, but if \$500 price tags have been the reason you've thumbed your nose at these stoppers in the past, well, you've now got one less reason to eschew the humble disc brake. Here are five systems that most of us can buy, and still afford to pay next month's rent.

## Avid Mechanical Disc

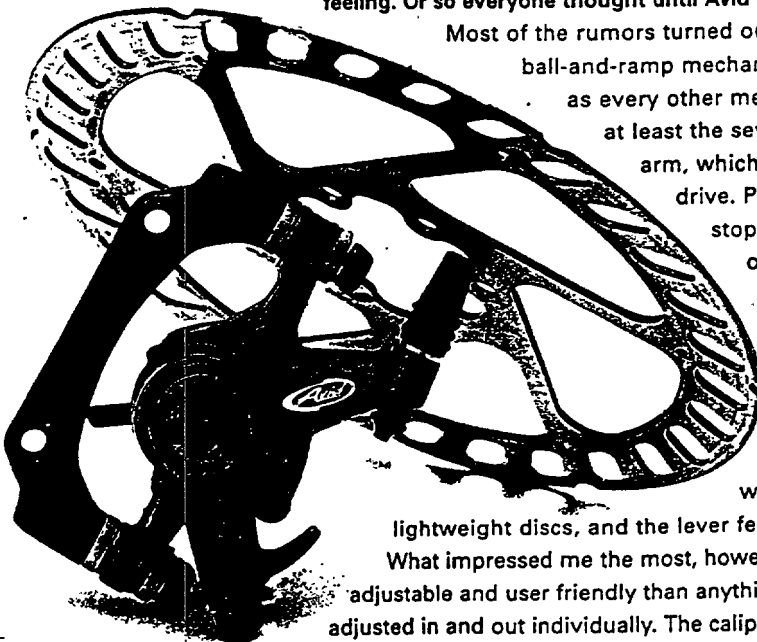
Price: \$199.90 (front and rear)  
Weight: 1.5 pounds per pair (no levers)  
Avid: 303-762-9353; [www.avidbike.com](http://www.avidbike.com)



The initial buzz surrounding the new Avid mechanical disc late last year was one of massive surprise. Here was this cable-actuated disc brake with ferocious stopping power and love-me-tender modulation.

How could this be? Cable discs were supposed to be grossly under-powered and just plain ugly feeling. Or so everyone thought until Avid came along and overturned the apple cart.

Most of the rumors turned out to be true. The Avid Cable Disc is a simple ball-and-ramp mechanical disc brake, cast from a similar design mold as every other mechanical disc since the beginning of time (well, at least the seventies). Pull the lever, and the cable actuates an arm, which then moves a pad via a sort of helical worm drive. Pad hits rotor, rotor flexes into inboard pad, bike stops. End of story. I am not sure what virgin sacrifice or chicken entrail reading went on at Avid to make this brake work so well in comparison to what came before, but it worked, that's for sure. This is a very good brake. Power is up there with the better hydraulics, pad glazing and fade (we were testing these in mid-winter, so I'm prepared to eat crow if I'm wrong on this one) were about on par with most small-rotor




lightweight discs, and the lever feel was superb.

What impressed me the most, however, was the setup. These brakes are more adjustable and user friendly than anything else out there. Anything. The pads can be adjusted in and out individually. The caliper can be adjusted side-to-side, as well as angled back and forth. This is a godsend in comparison to the thousands of shims floating around in the world trying to compensate for mis-aligned mounting posts. The only thing I can gripe about is pad wear: they seem to wear out a little quickly.

—Mike Ferrentino

# Exhibit C

THE TOP SECRET



# madformountainbiking.com

**Answer Flatfoot Shoes  
Were £49.99**



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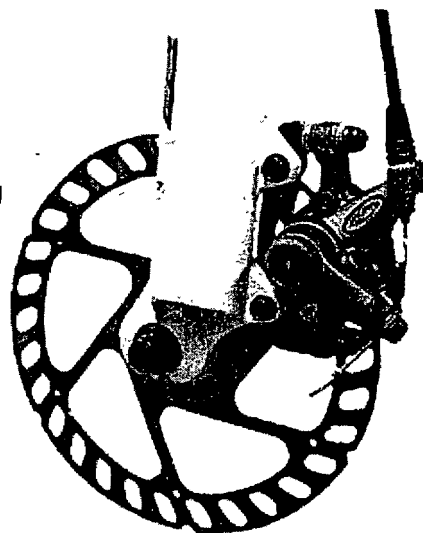


## Avidly awaited

*The much-hyped Avid mechanical disc brake gets a thorough pasting.*

Last year we had the misfortune of riding a lot of bikes with mechanical or cable operated disc brakes. Without exception, they were all hugely disappointing, with less power than a V-brake but extra weight and little consistency. We'd heard great things about two new cable operated discs - the Avid Mechanical and the Hayes HMX-1 - but with past experiences firmly etched in our memory we remained sceptical when the UPS man dropped by with a package from RAW (their distributors).

Your £99 gets you a calliper, rotor, mounting hardware and a Torx wrench (for the rotor bolts). Provided you've got V-brake compatible levers you won't need new levers, but you will need a new cable inner and outer to stretch to the calliper. It's worth getting a good quality cable (Gore or Shimano) to maximise the performance of the brake.



The calliper has a single-sided piston activated by a curved arm to which the cable is attached. As the lever is pulled the arm rotates counter-clockwise, pushing ball bearings up a spiralled ramp within the body, which, in turn, moves the left pad against the rotor. It's a single-sided piston, so the rotor is effectively bent across to the opposite pad. The calliper is a solid, one-piece casting, reinforced by bolts through the body, which resist the prising forces of the pads. Red dials on each side of the calliper adjust the position of the pads relative to the rotor and there's also an adjustment screw to alter the spring tension of the arm. Avid's instructions are not to use the adjusters at the brake levers to take up cable slack created by worn pads.

The mounting hardware fits both International Standard and Hayes mounts, eliminating the need for extra adaptors, but it won't work with Hayes chainstay mounts or pre-2000 Hayes fork mounts and there are no adaptors available. Not only that, Avid have included their CPS (Calliper Positioning System) to make drag-free installation possible, whatever the fork. Gimballed (concave/convex) washers make it possible to swivel the calliper in and out to overcome poorly aligned brake mounts. They've also included the more usual side-to-side adjustment found on most disc brakes. The Avid rotor uses the Hayes six-bolt pattern and features slots around its circumference designed to keep the pads mud-free.

The calliper, mounting hardware and rotor tipped the scales at 345g. An

average V-brake weighs 220g, so upgrading to Avid Mechanical discs front and rear will add around 300g (less than 3/4 lb) to the weight of your bike.





### Verdict

We liked the multi-way adjustment, which made it easy to achieve drag-free rotation. Mounting and set-up was moderately difficult, but set aside enough time, and read the instructions thoroughly, and you'll have no problem. [Click here](#) for a **workshop** guide to installing the brakes.

But enough of the grime time, you're all dying to know how it performed, aren't you? In combination with a Shimano Deore lever and Shimano cable, the Avid was superb. It worked well straight out of the box, with power comparable to a quality, well adjusted V-brake (such as XTR). Within a few muddy rides the power of the brake had increased to the point where it was easy to pull nose wheelies, even while seated - pretty impressive. They've got a lovely progressive feel that many hydraulic discs lack, so anyone upgrading from cantilevers shouldn't need too much time to get used to them.

On the rare occasions we got any drag, a few clicks on the red dials had things spinning smoothly again. We do have one complaint though; in the wet they squeal like a teenage girl at a Westlife concert.

Basically, they've got all the advantages of hydraulic discs - superior wet weather performance, no rim wear - at a cheaper price, but with slightly less power. Their only major drawback compared to fully hydraulic systems is the need for more constant maintenance in the form of regular cable replacements.

-  **Weight :** 345g (130g rotor, 215g calliper)
-  **Rants :** Wet screech
-  **Raves :** Powerful; progressive; makes up for all the old, crap cable discs
-  **Target Buyer :** Hydrophobe



**toshop**

### Avid Mechanical Disc

<b>Performance:</b>	<b>94 %</b>
<b>Value:</b>	<b>79 %</b>
<b>Overall rating:</b>	<b>88 %</b>
<b>Price at time of review:</b>	<b>£99.00</b>

Author : Danny Milner. Published : 17 Nov 2000

**Your say:** [Have you tried any mechanical discs?](#)

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## Exhibit D

DO NOT TYPE HERE

If you asked us a year or so ago what the future held for mechanical disc brakes, we would have told you someone thought the pet rock was a good idea at one time.

But times have changed dramatically in the mechanical disc brake market for the year 2001, thanks mostly to Avid. The recent introduction of Avid's revolutionary performing mechanical disc brake turned the bike industry on its ear, proving a more cost effective cable actuated disc brake could compete with hydraulics. Shortly after, Hayes started passing out samples of their all new mechanical disc brake that proved to be plenty competitive with the Avid in not only performance, but price as well. If that wasn't enough to put a smile on variety starved product managers, Grimeca introduced a new System 9 mechanical disc brake with competitive features, as well. Had enough? We're not done yet, Johnny Disco. Shimano, the king of drivetrain components, has now joined into the race with the introduction of their all new Deore Level mechanical disc brake for 2001. Ah, variety is the spice of disc brake life.

# SHIMANO

## DISC BRAKES

### Mechanically Inclined Braking From Japan

By Chris Hatounian

#### Deore disc details

If you take a good close look at Shimano's Deore caliper, you won't find rocket science, computer chips, or blinking LED lights. Instead, the Deore caliper features a simple cable-actuated mechanical rotating ball and ramp design that pushes one brake pad, while the opposing pad is fixed with a pad wear adjustment. The alloy caliper body mounts to most frames with International A-type flange mount, with Post-style mount available as an option. The caliper also features cable adjustment, but no spring tension adjustment. The front caliper tips the scales at 280 grams, while the rear weighs in at 285.

The Deore rotor is your basic stamped and drilled stainless steel unit, with 6-bolt mounting, 160 mm diameter dimensions, and a weight of 168 grams. The Deore brake kit also includes Torx T25 fixing bolts with tightening plates, caliper fixing bolts that are drilled for safety wire. And finally, Shimano's spec sheet states that the Deore disc brake is compatible with any 1.5 or 2.5-finger V-Brake lever.

Suggested retail price for a complete set (that's front and rear) is \$150. That includes everything but the brake cable and housing. Not bad, not bad at all.

#### Field testing

The first thing we noticed about the Deore Disc Brakes is that they take a whole lot of time to break-in before they can deliver decent braking power. So much, in fact, that we called Shimano concerned about whether the brakes were working properly. And their response was to do exactly what we were already doing — ride the doggy droppings out of them to get the rotors good and burnished. So we went out on several rides and braked like a neurotic housewife in a mini van with a cell phone in each ear on every hill we could find. The braking got better with each outing, but as of this writing, not as powerful as any of the competitive mechanical discs on the market. How about wet? Sorry, the gutters of So Cal. have been dry lately.

With our performance verdict on hold on the Deore disc's, we can only close by saying the Deore's are very competitively priced, feature first-rate quality and attention to detail, and have a very smooth feel for a mechanically-driven system. Now, if we could just get them to break in...Stay tuned.

For more information on Shimano Deore disc brakes, contact: Shimano America, (800) 423-2420;

Web: [www.shimano.com](http://www.shimano.com)

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## MORE FROM MATT

**BEST DISC BRAKE:** I like the Shimano XT disc, but my impression of it was tarnished when the price suddenly jumped \$90. Even so, it works with a smooth, progressive action, and a nice, light lever feel. However, there's no doubt that the biggest news in disc brakes this year is the Avid Mechanical. It takes the currently available mechanical disc brakes, slaps them silly, gives them a wedgie, pulls their pants down and gives them a whirly for good measure before kicking sand in their face and taking their girlfriend. It stops powerfully, it modulates, it has a good lever feel, it doesn't squeal, it's consistent, it doesn't fade. How many mechanical disc brakes have I said that about? For that matter, how many hydraulic discs have I said that about? But wait, there's more! It has the best mounting system available, you can choose your own levers, and you don't have to bleed them.

**BEST SHOE—ALMOST:** The Sidi Action is one of the best-fitting shoes I've ever worn. Surprising because it uses full mechanical closures. It fits snug in the toes and arch as well as in the heel. I find this much preferable to shoes that are snug in the heel, but leave my toes and arch swimming (Specialized, Answer, Nike, Shimano). The stiffness is a nice balance of raw forward motion and walking ease. My problem, beyond the price (\$230), is the sole. The replaceable lugs are very cool, but the Sidi sole continues to be too hard for secure walking on anything but soft ground. Also, the mid-sole is raw, hard plastic, which makes riding unclipped damn scary.

**BEST SEATPOST:** The Thomson seatpost isn't particularly exciting. It's only available in silver or black, it's light but not fantastically

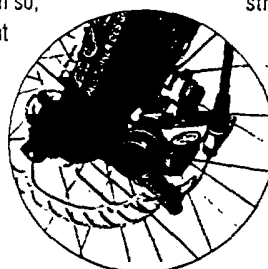
light, and it doesn't have a very fancy head. However, it is simple, strong and creak free, which is everything you want in a seatpost.

**BEST GRIPS:** Normally I wouldn't bother naming a "best grip" because it's such a personal choice. However, Answer Racing Slicks are great grips, though most people wouldn't know about them because they are BMX grips. By simply cutting the inner flange off, you have a tacky, not-too-thin, not-too-thick grip with a small outer flange for extra security.

**BEST UPGRADE:** Gore Ride-On cables make your shifting and braking better. It's that simple. Plus, with proper installation, they will last a great deal longer than conventional cables and housing. I've been using a set for close to three years and it's nearly as smooth as new.

### BEST AND WORST PRODUCT OF THE YEAR COMBINED:

Tubeless. One of the few true advancements in the past couple years. They make a rider's quality of life better by reducing one of the most frustrating elements of riding a bike—pinch flats. As a side benefit you can also run lower air pressures. However, they are also super expensive (though the price should come down in '01), and only available in limited tread patterns. You still have to carry a tube and pump with you (you can still puncture or tear a sidewall), they aren't lighter, it's easier to ding a rim at lower air pressures, and there isn't an accepted standard yet. All this to reduce pinch flats. I'm waiting for the dust to clear and the industry to get its act together on this one. In the meantime, I know another way to avoid pinch flats: Use sensible tubes and ride smooth.



Good things come to those who wait.



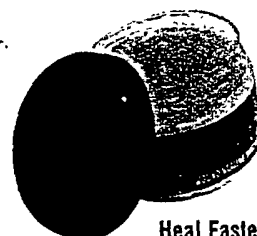
Almost great.

## INDUSTRY AWARDS

## AND THE FINAL TWO

**STRAIGHT SHOOTER AWARD:** Keith Bontrager, Joel Smith (Answer), Scott Montgomery (Cannondale). It's simple with these guys. I ask a question, I get an honest and clear answer. If their products have an issue, they tell me. If I'm an idiot, they tell me. If the honest answer is to the advantage of their competitors, they still tell me. A disappearing breed.

**BEST AFTER A CRASH:** Brave Soldier Road Rash+. I crash. I crash a lot. I use Brave Soldier. I use a lot of Brave Soldier. It makes my flesh heal faster so I can go out and crash again. And use more Brave Soldier. Seriously though, the stuff seems to do what it says it will, soothe the pain and speed up healing. I know, I've used it—a lot.



Heal Faster.

## BETH'S PICKS

**SUGOI ULTIMATE TECHNIFINE STRETCH KNICKER:** For years I've been faced with the same no-win question for early-spring and late-fall rides: Do I overheat in tights or be chilled in shorts? It simply seemed that nobody made a decent pair of knickers for smaller riders. Until now.

**SMITH TOASTERS:** The Toasters provide everything I love about the Slider series in a

killer design for smaller faces. They're super-lightweight, have a great non-slip nose pad, offer nice wind protection, and are the best-looking glasses yet.


**ZOIC IRIS JERSEY:** One thing I've always loved about Zoic is that it takes women riders seriously. No silly pink flowery jerseys or diaper-feeling shorts. Just great-looking cycling wear that performs on and off road. It's

got to be the lightest-weight and best-wicking jersey I've tried. If there was more than a single pocket in the rear, it might be perfect.

### BOB SPORT UTILITY STROLLER D'LUX:

Yep, that's right, a full-suspension stroller. With three inches of adjustable travel, fully padded seat, reclining seat back, and quick and easy folding design, how can my kid not grow up loving the off-road world? ☺

[illegible]



# Disc Brake BUYER'S GUIDE

Finally! Find the ideal stopper for your riding style and budget with our exclusive—and comprehensive—test.

by Garrett Lai, Andrew Juskaitis, and John Peters  
Unless you're on a super-tight budget or building a featherweight bike, there's no reason not to buy disc brakes. Most mountain bikes now come with standard disc mounting tabs (forks have had them for years), and you can outfit a bike with disc brakes for as little as \$200. (Disc-specific wheels will add more.)

Rim brakes still have the advantage in cost and weight, but disc brakes have an undeniable performance edge.

Nearly every disc available has more power than even the best linear-pull rim brake. Discs really excel in wet or muddy conditions, where rim brakes falter miserably. Plus: Discs need little adjustment for wear, and they're much more tolerant of real-world abuse such as out-of-true wheels (which can rub on rim brakes).

So what's not to love? Ignorance. There's a bewildering array of discs available, with all sorts of features touted to make them superior. Our test takes these features into account but focuses on what truly matters—real-world stopping power and control. We rounded up every 2001-model disc brake that isn't downhill-specific >>>

# BUYER'S GUIDE

With the exception of price, the columns are arranged in order of importance, with modulation the most critical, and installation the least important.

**MODULATION** The most important attribute—the measure of controllability. A brake with good modulation has power that's easy to regulate, with a predictable proportional feel between lever force and stopping power. A brake with poor modulation is grabby, with sudden ramp-up and unpredictable response.

**USEABLE POWER** How much you can actually use in real-world conditions. A brake can only be used to its fullest as long as you avoid wheel lock-up. A brake with great useable power needs to have lots of stopping power coupled with good modulation throughout its range.

**STOPPING POWER** Measured on Cannondale's brake dyno by applying a specific load to the brake lever and measuring stopping distance under dry, ideal conditions. The rating indicates relative performance—a 10 means the brake ranks in the 90th percentile, a 1 puts it in the 10th percentile.

**LEVER EFFORT** Also measured on the Cannondale dyno, using stopping distance with a moderate (15-pound) load applied to the lever. It indicates stopping power relative to lever effort—a 10 rating requires the least effort, a 1 the most.

**HEAT BUILD-UP** Heat build-up can adversely affect braking performance. Fluid expansion can lead to lever pump-up in hydraulic brakes, while all brakes can suffer from heat-induced fade (diminished stopping power).

**LEVER SHAPE** Lever shape and range of adjustability.

**INSTALLATION** Design of hardware; compatibility with frames, forks and shifters; ease of installation and setup.

BRAKE	PRICE	CHAINRINGS	MODULATION	USEABLE POWER
Avid Ball Bearing Disc Brake	\$200	⊗⊗⊗⊗⊗	8	9
Hayes Hydraulic	\$500	⊗⊗⊗⊗⊗	8	9
Hope Enduro 4	\$480	⊗⊗⊗⊗⊗	9	10
Shimano Deore XT	\$450	⊗⊗⊗⊗⊗	9	9
Hayes Mechanical	\$200	⊗⊗⊗⊗⊗	8	8
Shimano Deore Mechanical	\$150	⊗⊗⊗⊗⊗	8	7
IRD Dual Banger	\$218	⊗⊗⊗⊗⊗	8	7
ProMax Hydraulic	\$300	⊗⊗⊗⊗⊗	6	6
Shimano Deore Hydraulic	\$225	⊗⊗⊗⊗⊗	6	6
Formula B4 Racing	\$444	⊗⊗⊗⊗⊗	7	7
Grimeca System 7	\$220	⊗⊗⊗⊗⊗	6	6
Hope Mini	\$350	⊗⊗⊗⊗⊗	6	6
ProMax Mechanical	\$200	⊗⊗⊗⊗⊗	6	5
Formula Evoluzione 9.5	\$388	⊗⊗⊗⊗⊗	5	5
Grimeca System 8	\$390	⊗⊗⊗⊗⊗	8	8
Magura Louise	\$378	⊗⊗⊗⊗⊗	4	7
Formula B4	\$230	⊗⊗⊗⊗⊗	3	3
Magura Julie	\$238	⊗⊗⊗⊗⊗	5	5
Tektro Novela	\$124	⊗⊗⊗⊗⊗	6	6
Formula Activa	\$188	⊗⊗⊗⊗⊗	6	3
Tektro Gemini	\$312	⊗⊗⊗⊗⊗	2	2
RST Mechanical	\$180	⊗⊗⊗⊗⊗	3	4
Shimano XTR V-Brake	\$145	⊗⊗⊗⊗⊗		

>>> and put it through a battery of tests to measure performance, using lab science backed by real-world feel. Then we picked four winners.

## HOW WE TESTED

We field-tested 22 disc brakes, all either hydraulic or cable-actuated mechanical designs. We included a Shimano XTR V-brake to compare discs to one of the best rim brakes. We didn't test downhill-specific (oversize rotor) designs, which are overkill for the way most of us ride.

Each brake was broken in, then rotated among at least three staff testers and rated individually for real-world performance. We also measured stopping power on a brake dyno at Cannondale's test lab in Bedford, PA. Cannondale's dyno is automated and consistent, so we were able to do multiple runs to ensure accuracy. And we performed our own testing—we

manned the equipment and used our own test procedures—to ensure objectivity.

## WHAT WE LEARNED

Here are three absolutely true things we learned from the test (besides which brakes we'd buy):

⊙ Disc brakes are clearly superior. Even Shimano's excellent XTR V-brake can't get close to matching discs. Only the Grimeca System 7, Formula Activa and RST Mechanical failed to best the V-brake's stopping power in dry, perfect conditions. Throw some mud or water into the mix and the V-brake won't fare as well. Unless you're low on cash or a rabid gram-counter, the V-brake comes up short.

⊙ You can't gauge performance based on design alone. Hydraulic brakes enjoy a more sophisticated aura than mechanicals, but that doesn't translate into better performance—some hy-



STOPPING POWER	LEVER EFFORT	CONSISTENCY	ERGONOMICS	INSTALLATION
8	10	9	7	9
7	7	9	7	8
8	8	9	7	6
9	7	9	8	5
7	7	7	7	9
5	4	9	7	8
6	6	8	6	6
8	6	6	6	9
8	7	8	8	6
10	10	6	7	7
2	6	8	6	7
6	6	8	7	6
8	7	7	5	6
6	6	6	5	7
7	6	7	7	3
10	10	3	5	6
6	6	4	6	5
10	8	6	4	6
5	2	6	7	4
1	6	7	6	8
8	8	8	4	2
1	1	6	4	2
2	2			

draulic brakes fared worse than mechanicals. It's also interesting to note that a multiple-piston design doesn't guarantee superior stopping power, although multi-piston brakes did yield better modulation than other hydraulic designs (but that doesn't necessarily make them better than mechanicals).

©It's tempting to choose a brake based on power alone, but trail testing doesn't support that idea. The most-powerful brakes on the dyno weren't deemed the most powerful on the trail. While a brake might generate phenomenal stopping power in the sterile crucible of a laboratory test, your ability to modulate that power effectively limits how much power you can use in the real world. It should come as no surprise that the brakes we rated as having the most useable power also scored highly in modulation.

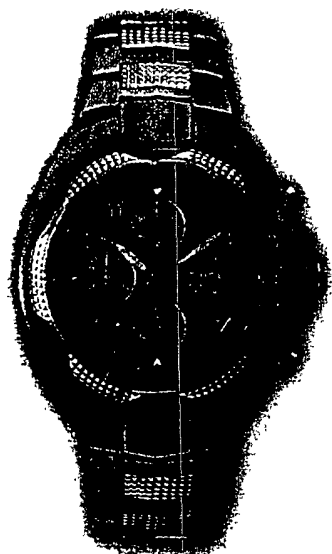
## DISC BRAKE SETUP TIPS

- 1. READ THE INSTRUCTIONS.** Then follow them. Duh, right? But many of us plow right into every mechanical project because we "know bikes." You can't do that with discs. Every manufacturer has different setup procedures, and doing what they tell you is the only path to maximum performance.
- 2. USE BLUE LOCTITE** to secure rotor bolts and caliper bolts, which frequently loosen with use.
- 3. USE A TORQUE WRENCH.** Evenly torqued bolts are much less likely to loosen.
- 4. FILE PAINT FROM THE CONTACT POINTS** on brake mounting tabs for better mounting alignment and less squeal.
- 5. CENTER PADS** using the manufacturer's recommended procedures, which help reduce wear and squeal.
- 6. KEEP PADS CLEAN.** Don't handle rotors with greasy hands. Use aerosol automotive brake cleaner on contaminated rotors before use.
- 7. REPLACE CABLE AND HOUSING** on mechanicals as you would a linear-pull—more often in poor conditions. Cable-actuated brakes depend on clean cables for smooth operation.

## Disc Brake Contact Info

Avid, 303/762-9353;  
[www.avidbike.com](http://www.avidbike.com)  
 Formula, 800/507-6444;  
[www.formula-brake.it](http://www.formula-brake.it)  
 Grimeca, 818/686-3466;  
[www.bassanogrimeca.it](http://www.bassanogrimeca.it)  
 Hayes, 800/747-1681;  
[www.hayesbrake.com](http://www.hayesbrake.com)  
 Hope, 800/303-6863;  
[www.hopetech.com](http://www.hopetech.com)  
 IRD Interloc, 888/804-1095;  
[www.interlocracing.com](http://www.interlocracing.com)  
 Magura, 618/395-2200;  
[www.magura.com](http://www.magura.com)  
 ProMax, 310/635-4858;  
[www.promax-usa.com](http://www.promax-usa.com)  
 RST, 253/922-9541;  
[www.rst.com.tw](http://www.rst.com.tw)  
 Shimano, 949/951-5003;  
[www.shimano.com](http://www.shimano.com)  
 Tektro, [www.tekro.com](http://www.tekro.com)

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This Expedition® chronograph is about \$90.



This multi-function watch is about \$75.

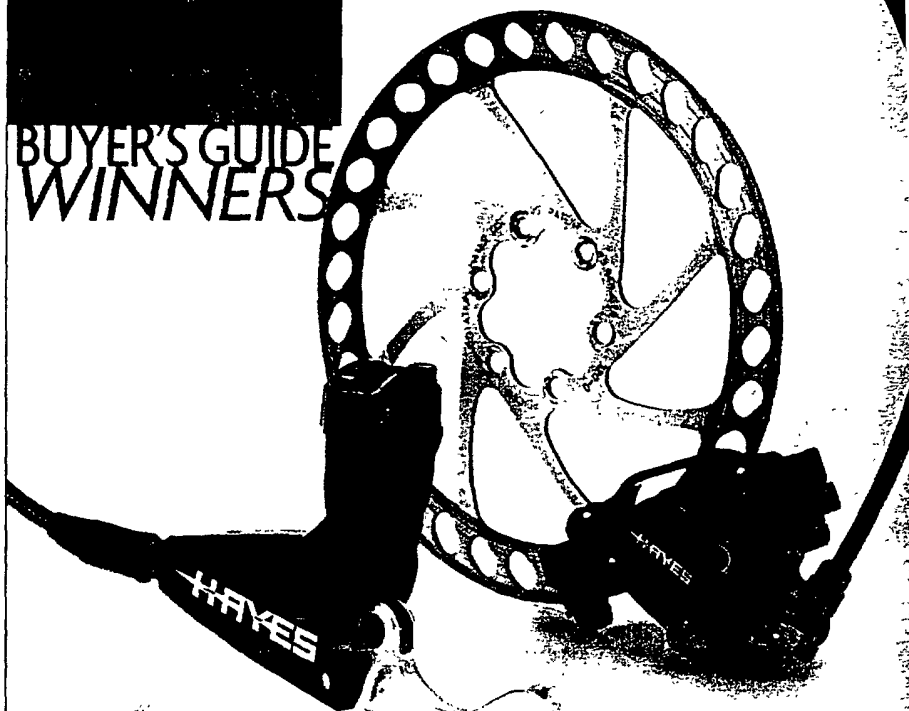


This Reel Gear® combo with i-Control® crown set is about \$50.

**TIMEX**

It takes a licking and keeps on ticking.

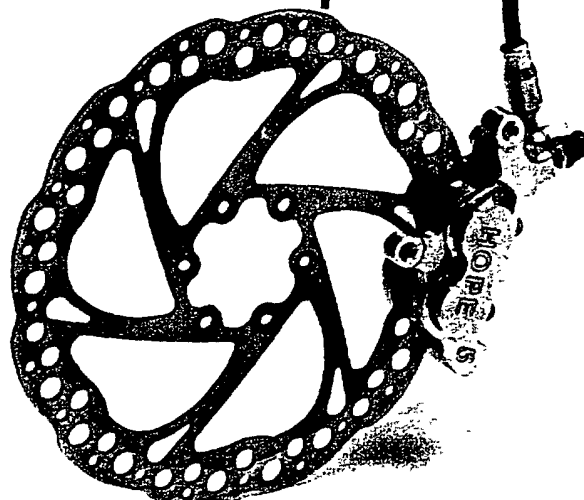
## BUYER'S GUIDE WINNERS



### Best Overall: Hayes Hydraulic

It combines excellent modulation with gobs of stopping power. Hayes discs are ultra-consistent, and have near-perfect lever feel combined with excellent hardware and extremely simple setup. Their widespread popularity virtually guarantees easy-to-find replacement parts, and you can find qualified help in just about any shop in the U.S.

### Best Hydraulic: Hope Enduro 4



Unbeatable modulation and sizzling stopping power make these the ultimate performance brakes. The four-piston calipers make for amazing lever feel and extremely low-effort stops, and the levers provide top-notch ergonomics. The only thing holding them back is their relative scarcity, both in regard to parts availability and service—there aren't a lot of shops familiar with these English stoppers.

NRG



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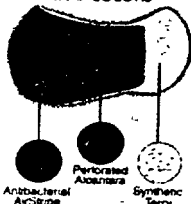
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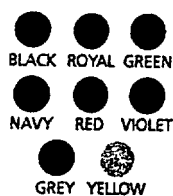
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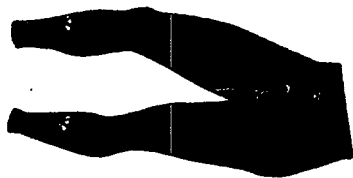
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**DRYLINE TIGHT  
WITH CANTARA CHAMOIS**



**ARM,  
KNEE  
OR LEG  
WARMERS  
IN 6 COLORS**

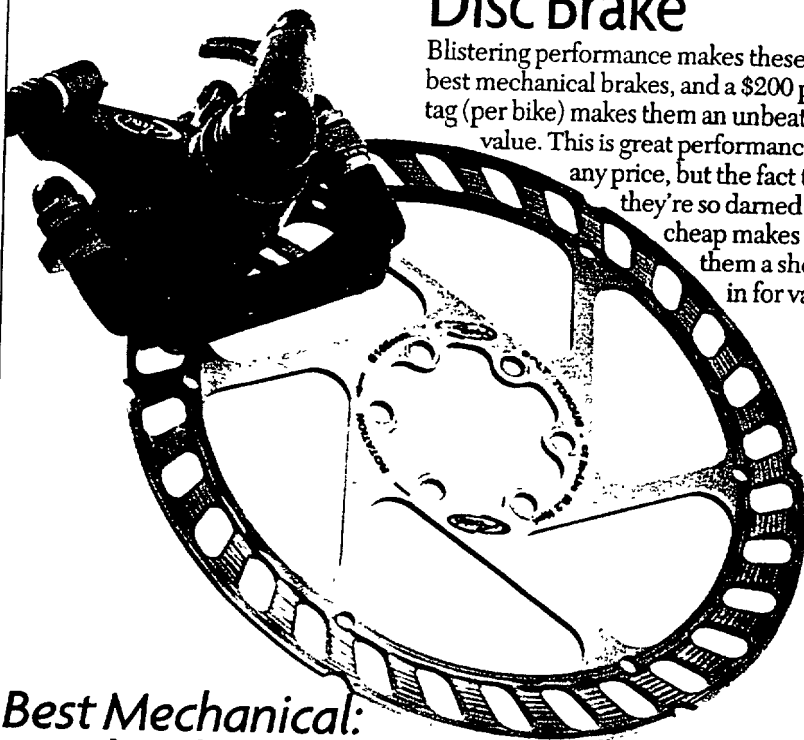


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## BUYER'S GUIDE WINNERS



### Best Value: Avid Ball Bearing Disc Brake

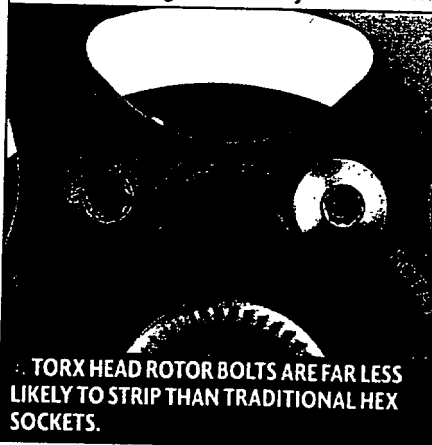
Blistering performance makes these the best mechanical brakes, and a \$200 price tag (per bike) makes them an unbeatable value. This is great performance at any price, but the fact that they're so darned cheap makes them a shoo-in for value.

### Best Mechanical: Avid Ball Bearing Disc Brake

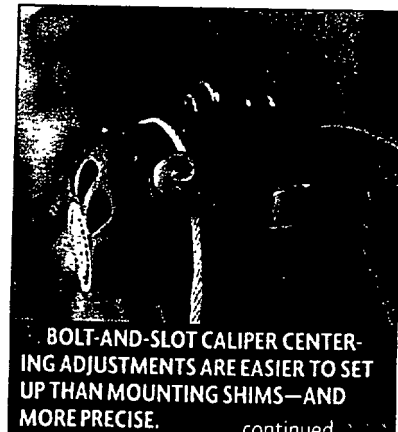
Avid's mechanical disc brake shatters the myth of hydraulic superiority. These cable-actuated stoppers are amazingly consistent, extremely easy to modulate, and give stopping power that bests all other mechanicals, and almost every hydraulic. These are among the easiest brakes to set up, you can get parts anywhere and service is easy to find. The only thing preventing these from taking top honors is lever feel—the longer rear cable run guarantees a spongier-feeling rear lever. And over time, a hydraulic system's lever feel remains consistent, while a cable system degrades with wear and dirt build-up.

## What Makes a Good Disc Brake?

Our pictorial guide shows you the six most important things to look for.



**TORX HEAD ROTOR BOLTS ARE FAR LESS  
LIKELY TO STRIP THAN TRADITIONAL HEX  
SOCKETS.**



**BOLT-AND-SLOT CALIPER CENTERING  
ADJUSTMENTS ARE EASIER TO SET  
UP THAN MOUNTING SHIMS—AND  
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continued

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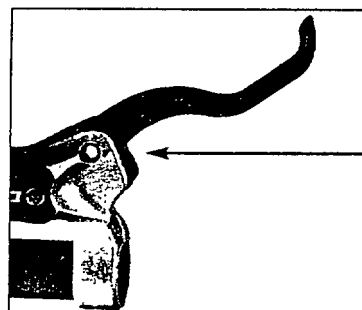
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## BUYER'S GUIDE

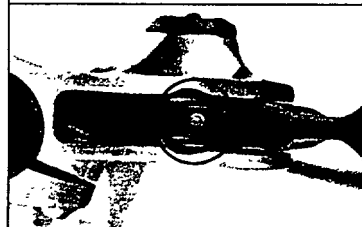
*What Makes a  
Good Disc  
Brake?*



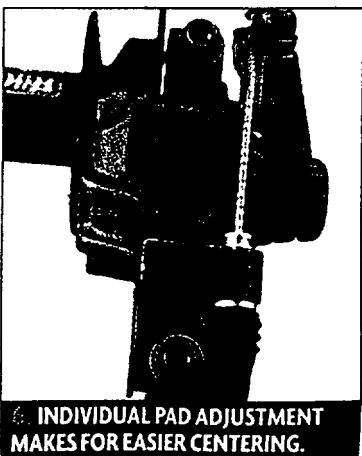
CABLE ANCHORS THAT USE A PINCH MECHANISM (LEFT), RATHER THAN ANCHORS THAT PUT A SHEAR LOAD ON CABLES (RIGHT).



4. REACH ADJUSTMENT ON LEVERS.



5. LEVERS WITH A BIG, ROUNDED FINGER AREA (LEFT)—NOT THIN, WHICH FEEL SHARP.



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# 2000

## Mountain bikes show up at the Olympics for a second time.

Once again the Americans get smoked and Paola

Pezzo claims gold. France's Miguel Martinez caps his already sensational year with his first Olympic win... Jerome Chiotli admits to using EPO when he won the '96 World Championships. After four silver medals, Thomas Frischknecht is finally awarded his rainbow jersey when Chiotli gives his up... Anne-Caroline Chausson becomes the all-time winningest World champion with nine (8 DH/1 DS) titles... Joe Breeze gets a national grant for safe trails to school... The union between Time Warner and AOL becomes the largest corporate merger ever... A naked Maria Sreb graces the inside of *Outside* magazine... Dan seeks out a girlfriend in his *Hug the Bunny* column... Mary Grigson wins the Napa World Cup on Fisher's newest

full-suspension bike, the Sugar... David Letterman has quintuple-bypass surgery... For the first time, Worlds dual-slam winners receive a rainbow jersey... 29-inch-wheels have the industry buzzing... Nicolas Vouilloz suffers a flat tire at the World Championships, breaking his seven-year win streak... Americans reclaim some honor at the Worlds with three golds, two silvers and bronze... Bobby Knight is fired as Indiana University's basketball coach... Tubeless tires gain some momentum... Trek drops its downhill program and focuses on its five-rider cross-country squad. Its new Fuel bike is ridden by Chantal Daucourt at Worlds... Fisher and Specialized also dump their DH programs... Manitou introduces its Mars line of suspension forks...



RockShox unveils the Psylo, its first all-new fork since the Judy... K2 (formerly Pro-Flex), which made only full-suspension bikes, begins manufacturing a hardtail... Swobo goes out of business... RockShox stock goes from an all-time high of \$17.50 in 1996 to an all-time low of 44 cents, and the company relocates to Colorado Springs... Shock rapper Eminem grabs three MTV Music Video awards... After building frames for 18 years, Fat City Cycles goes out of business... NORBA sanctions a National title for 24-hour racing... The planned Freeride World Championships in Whistler, B.C.,

are canceled when event sponsors fail to materialize... The long-awaited PlayStation 2 hits store shelves... John Tomac retires after a 15-year career... SRAM, makers of GripShift twist-shifters, show off a new trigger shift system... Though not available to the public yet, Shimano unveils a new DH fork and off-road wheelset... Steve Larsen is named to the Olympic team, but then removed by the Selection Committee. He goes on to win three consecutive NORBA Nationals... Avid's mechanical disc brake kicks ass on most hydraulic brakes... More upside-down forks are shown with Manitou's DH Dorado and Marzocchi's XC RAC... Carey Hart pulls the world's first motorcycle backflip at the Gravity Games... Litespeed assumes the titanium throne once and for all with its purchase of Merlin... The World Cup series visits Mexico for the first time... Specialized follows in Cannondale and GT's footsteps by sponsoring a Euro road team... The UCI announces that the World Championships will return to Vail, Colorado, in 2001... See ya there.

LEFT: PHOTOS BY MARK DAWSON/BOTTOM LEFT TO RIGHT: ZAPATA, ESPINOZA/CENTER: EVERETT COLLECTION/ZAPATA, ESPINOZA



"We used to be rock stars, but now I feel like I'm playing for Journey." —GT product manager Steve Cuomo on the recent industry downturn

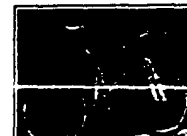
Person pictured in MB most	Travis Brown (12), Hans Rey (10)
Hall of Fame inductees	Keizo Shimano, Linda DuPriest, Steve Tilford, Dave Wiens, John Stamstad
NORBA champs	XC: Steve Larsen, Ruthie Matthes; DH: Eric Carter, Missy Giove; DS: Brian Lopes, Cheri Elliott; SX: Carl Swenson, Ann Trombley
World Cup champs	XC: Miguel Martinez, Barbara Blatter; DH: Nicolas Vouilloz, Anne-Caroline Chausson
World champs	XC: Miguel Martinez, Marga Fullana; DH: Myles Rockwell, Anne-Caroline Chausson; DS: Wade Bootes, Chausson
\$1,000 would get you	Giant XTC SE2; aluminum bike Shimano Deore shifter/front derailleur, LX rear derailleur, Formula MD-1 brakes



Two years after the project started, Cannondale's MX-400 is in production.



Americans get saturated with reality TV with the mega-hit "Survivor" and mega-bomb "Big Brother."



After cutting all ties with RockShox, Paul Turner starts his own company, Maverick, and builds FS

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## Mountain Bikes

Intro • The Skinny • Short Course • The Goods • Keep it Alive • The Lowdown



## Narrowing the Field

Face up to it: You'll need to spend at least \$500 for a real mountain bike. Less cash can buy an off-road poser, but such cheap rigs will disappoint with lame parts like mushy brakes and heavy wheels that need frequent truing. Spending about \$500 will net you components that work crisply—like shifters that click right into gear with no crunching and brakes that are easy to modulate—a lighter frame, and a shock fork that doesn't behave like a pogo stick.

## Anatomy Lesson

Finding a frame that feels right is more important than choosing a ride based on the components that hang from it. Feel is a matter of fit and of the frame material you select—each material has its own personality. But frames of a particular material are not all created equal: More expensive tubing gets butted, shaped, and otherwise tuned to dial-in certain ride characteristics. The trick for bike makers is to balance the competing needs of stiffness and ride comfort, while shaving pounds in the process.

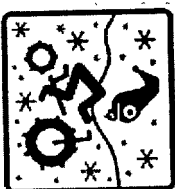
**Aluminum: rock-solid rigidity.** Frames made of aluminum alloy, which dominate the market these days, can seem nearly flexless. Many riders love the responsiveness, but smaller, lighter mountain bikers may find the ride teeth-chatteringly rough. Al frames are winners in the fewest-grams-per-dollar weight contest.

**Steel: smooth riding, out of style.** Market momentum has pushed steel aside in favor of

## IN EXTREMIS

## Mush, You Metallic Mutt

Winning Alaska's first-ever Iditarod Impossible 2000, a 1,100-mile human-powered race from Krik to Nome over the Iditarod Trail, requires endurance beyond reason—namely, muscling anything human-powered over snow and frozen lakes through March blizzards in temperatures down to minus 30 and winds up to 80 mph. Mountain-bike contenders need seriously tricked-out wheels to maximize their float in deep powder. Mike Curjak started with a steel Team Marin bike and revamped it with disc brakes, wide steel forks, 3.2-inch aluminum rims (which he riddled with 60 quarter-size holes to trim weight), and double-tube 4-inch-wide Remolino tires. It was good enough to win in 15 days, one hour, and 15 minutes. How did the rig handle? "Like a motor home," Curjak gripes. "At those low temperatures, different metals contract at different rates. It was like driving a car with a loose linkage."—N.H.





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## SEARCH



**Titanium: best of all worlds.** Many consider titanium the ultimate frame material. It's light, durable, and similar to steel in its forgiving ride. But where steel and aluminum are always battling the forces of fatigue and corrosion, Ti successfully resists both and thus will never need paint. But then there's that eye-popping price tag: no less than \$1,500.

**Carbon fiber: the cost of fine control.** Like titanium, featherlight and forgiving carbon fiber will not rust or corrode, and the stuff is extremely strong. Bike designers love it because they can append a little material here or there to fine-tune the ride. But you pay for their privilege: Prices run upward from \$1,500.

**A suspension primer.** Shocks keep your tire connected with rough ground so you can ride faster with more control. They won't turn a bumpy trail into a sidewalk, but they will soften the ride, especially if you're contending with rocks, roots, and other obstacles.

Shocks use a variety of materials to soak up bumps. Most common are metal coil springs, often combined with rubberlike elastomer bumpers. Some pricier systems sport air springs, which shave weight and are easily adjustable for rider heft—just pump air in or bleed some out. More expensive shocks add oil damping. These expert-level setups offer smooth, controlled action as the fork compresses and rebounds. That is, they don't dive and then suddenly snap back at you when you hit an obstacle.

Dual suspension doesn't necessarily serve up twice the comfort or performance, though it does give stay-in-the-saddle joy on downhill and bumpy trails. But know that a springy back end adds weight, complexity, and maintenance demands for the sake of speed and comfort. Dozens of different designs are available, each with its own subtle advantages.

## Fit and Finish

A bike that fits is safer, more comfortable, and better able to help you clean the tricky, technical terrain that others walk.

**Fundamentals of fit.** To size a mountain bike, straddle the top tube and make sure you have at least two or three inches of clearance between the top tube and your nether regions. Next, adjust the saddle height so that your knee is just slightly bent when the pedal reaches six o'clock. If you're between two frame sizes, go with the smaller one—a longer stem and seatpost can make up for short tubes, and you'll give thanks for the extra clearance every time you need to dismount quickly. The distance from seat to handlebars is just as key—the wrong reach can cause pain from neck to butt and everywhere in between. There's no hard rule for the right reach, but avoid extremes, such as stretching out like Catwoman mid-dive or sitting bolt upright like you're riding a

1. The first part of the document is a list of names and their corresponding addresses. The names are: John Doe, Jane Smith, and Bob Johnson. The addresses are: 123 Main St, 456 Elm St, and 789 Oak St.

OUTSIDE BUYER

beach cruiser. Test-ride different bikes, and remember that parts can be swapped until everything feels right.

## Tiebreakers

There's no need to fret over every last component when comparing bikes; within a given price range, they come similarly equipped. Shimano is at the top of the bike-parts biz, a place they've earned with a broad line of components that generally work very well. In ascending order, Shimano offers these parts groups: Acera, Alivio, Deore, Deore LX, Deore XT, and XTR. Higher-priced component groups give you greater durability, precision, and finish, while subtracting weight. But you can spend half the money for lower-end stuff and still get 90 percent of the performance. Other component brands found on many new bikes include Avid (brakes), SRAM (Gripshift and derailleurs), and Truvativ (cranks)—all are worthy, as they've had to work hard to dislodge Shimano. Disc brakes have been gaining popularity the past several years. They offer stopping power to spare, especially in wet weather, as discs sit out of gunk's way in the middle of the wheel. But most disc setups are noticeably heavier than rim brakes. Here's one sure thing in components: There's no question about the desirability of clipless pedals, which mate to cleated shoes for an efficient energy transfer. If you aren't using them right now, you'll covet them soon.

Now let's go out and hammer on a dozen of this year's best rides, representing deals, steals, and mountain bikes to simply drool over.

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# Exhibit I

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# DISC BRAKE COMPETITIVE ANALYSIS

---

Mountain Bike

AVID

Bicycling

HAYES

MAGURA

PROMAX

SHIMANO

SHIMANO

TEKTRO

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## M A G A Z I N E

### Brands of Brakes Plan to Buy

2001	%		%	1999	%	1997	%
Disc Brakes		Rim Brakes		*Disc and Rim Brakes		*Disc and Rim Brakes	
Shimano	45.0	Shimano	63.8	Shimano	67.3	Shimano	61.2
Hayes	32.5	Avid	15.5	Hayes Brakes	11.5	DiaCompe	11.9
Avid	22.5	Cane Creek	6.9	DiaCompe	7.7	Ritchey	9.0
Magura	17.5	Magura	3.4	Avid	5.8	Avid	7.5
Hope	7.5	Ritchey	3.4	Magura	1.9	Control Tech	4.5
Formula	5.0	Coda	1.7	Onza	1.9	Magura	4.5
Grinneca	5.0	DiaCompe	1.7	Ritchey	1.9	Coda	1.5
				Sachs	1.9	Hayes	1.5

\*The 1999 and 1997 subscriber studies do not breakdown the brake categories into disc and rim.

Source: Bicycling Magazine Subscriber Studies

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M A G A Z I N E

## Brands of Brakes Currently Owned

2001	%		%	1999	%	1997	%
Disc Brakes		Rim Brakes		*Disc and Rim Brakes		*Disc and Rim Brakes	
Shimano	62.7	Shimano	80.4	Shimano	85.1	Shimano	81.7
Hayes	14.9	Avid	14.2	DiaCompe	14.3	Campagnolo	35.5
Magura	6.0	DiaCompe	9.8	Avid	7.6	DiaCompe	22.9
Coda	4.5	Coda	3.0	Ritchey	2.7	Avid	14.3
Formula	3.0	Ritchey	2.5	Magura	1.5	Ritchey	9.6
Avid	1.5	Cane Creek	1.4	Paul's	0.6	Magura	6.6
Hope	1.5	Magura	0.8	Hayes Brakes	0.3	Orza	2.3
				Rhino	0.3	Sachs	2.0

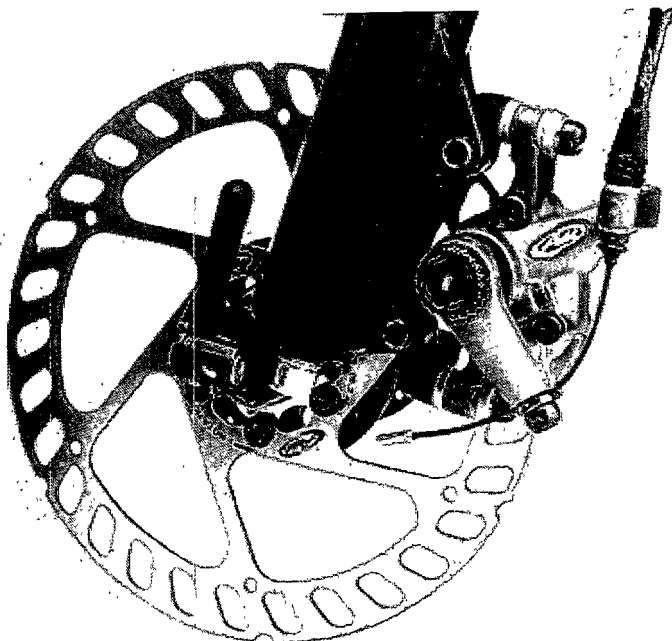
\*The 1999 and 1997 subscriber studies do not breakdown the brake categories into disc and rim.

Source: Bicycling Magazine Subscriber Studies

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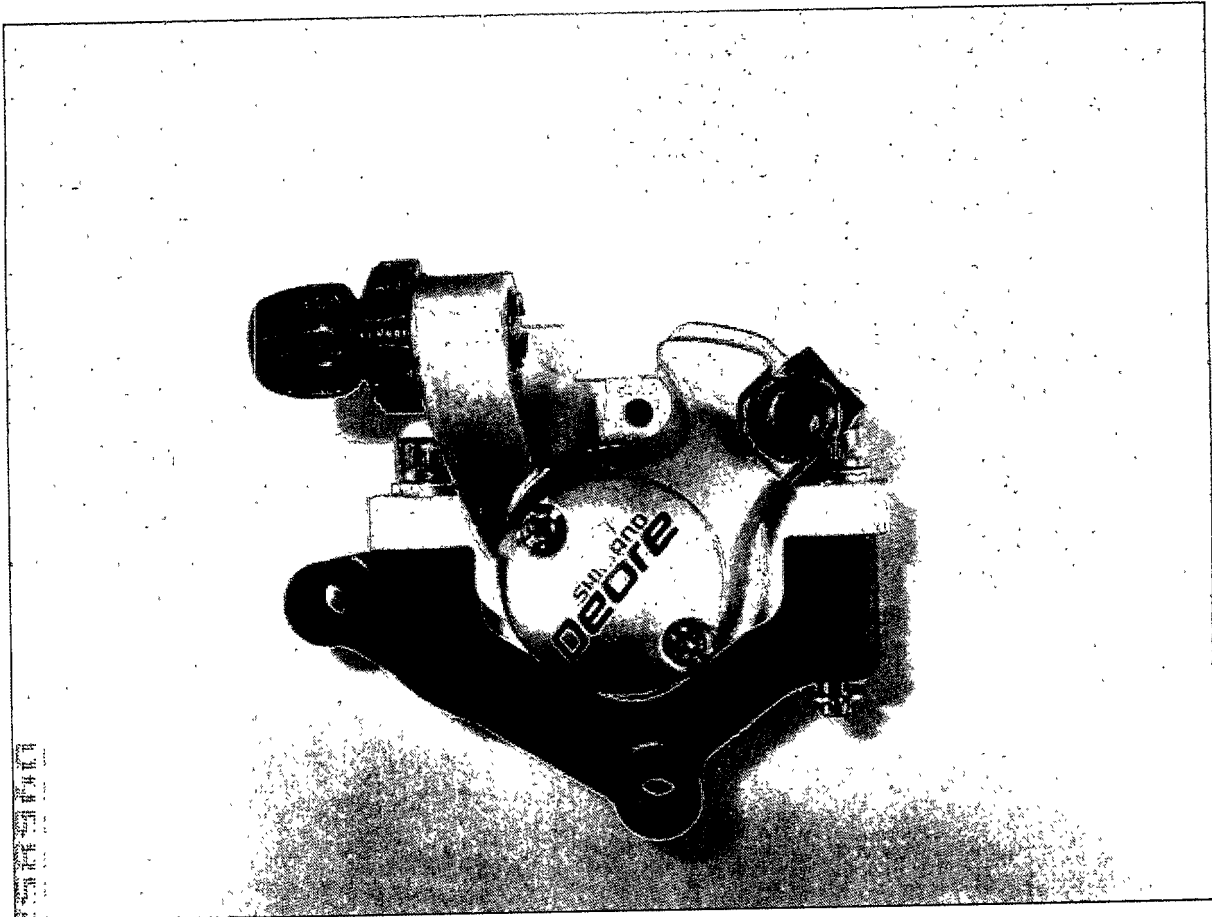
## Exhibit J

Exhibit J

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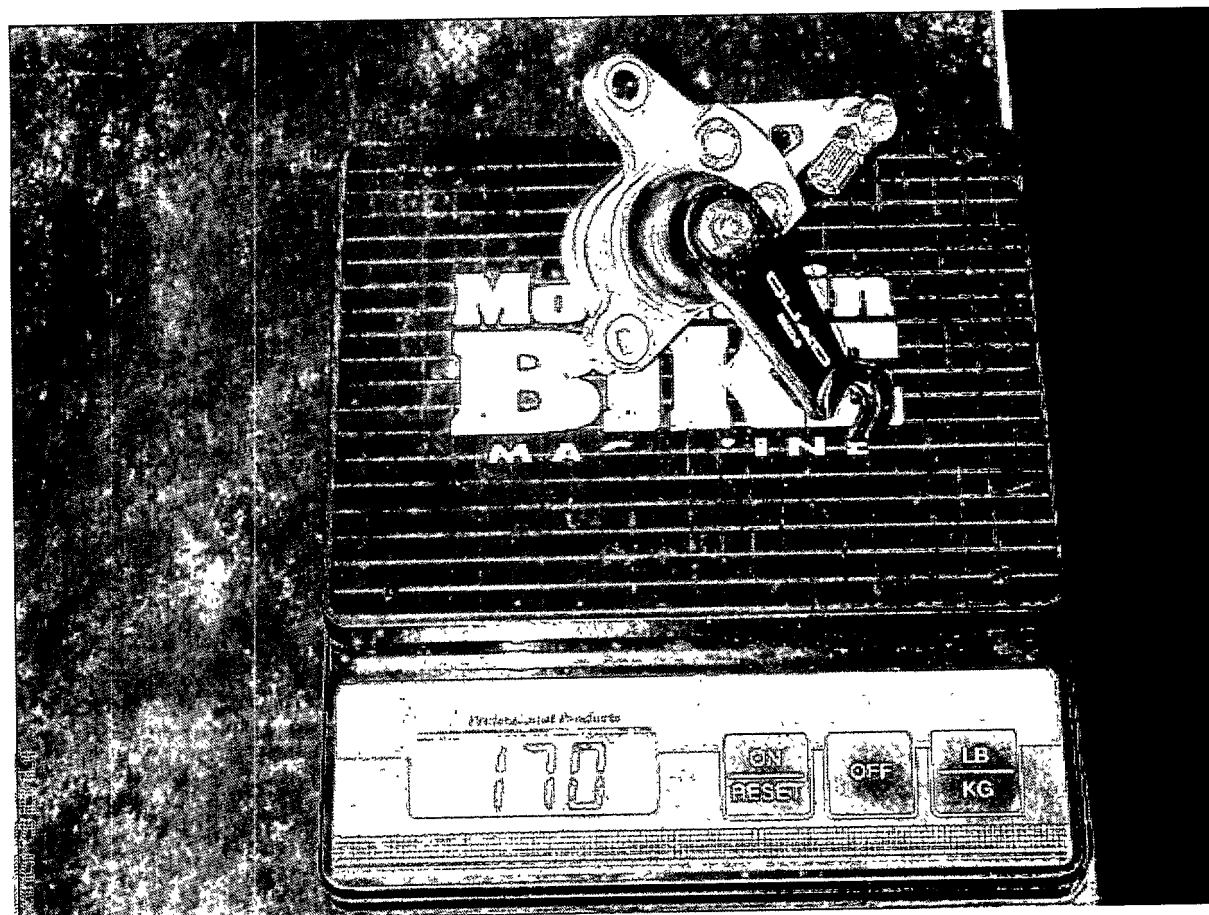
# Exhibit L

Exhibit L

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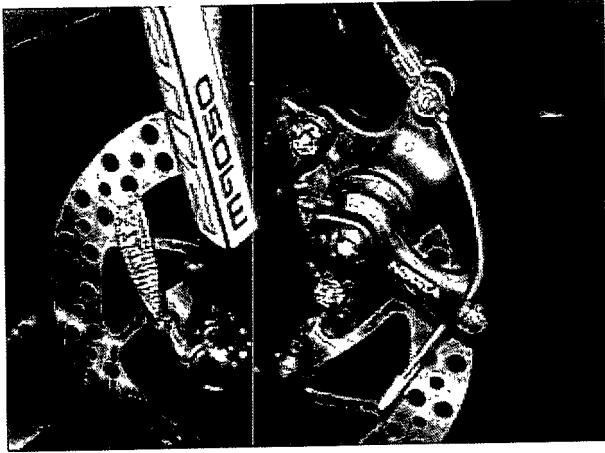
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EXHIBIT M



# Exhibit N

Exhibit N

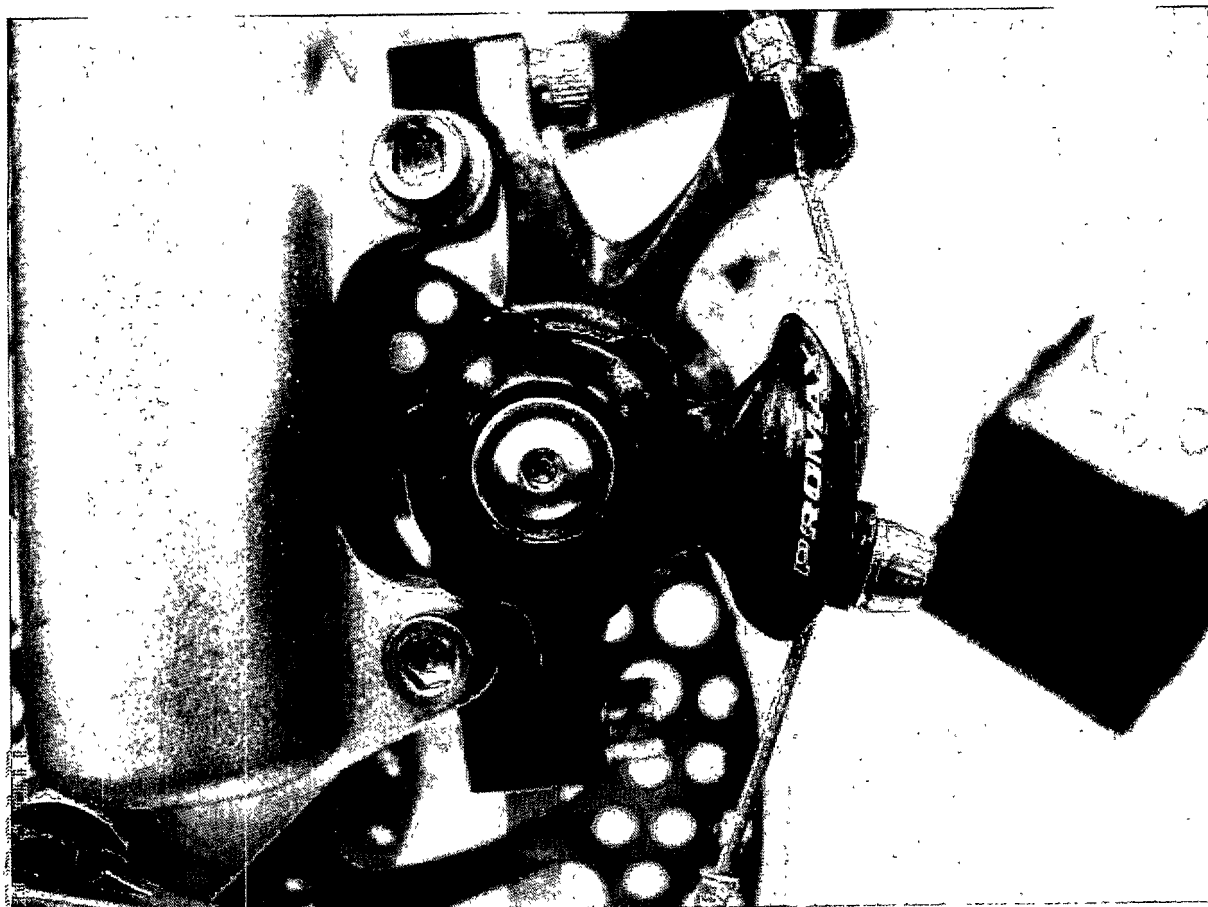


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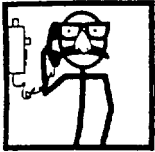
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**96**

# Terms Of Sale And General Policies



Quality Bicycle Products is a **wholesaler** and will only sell to legitimate bicycle retailers. A business phone listing, liability insurance and photos of the store front are required to establish an account.

Quality's customer service agents **hours** are Monday through Friday 8:30 a.m. to 6:00 p.m. central time.



We stress the use of our **catalog part numbers** when placing orders. It allows us to serve you much more efficiently and accurately.

Orders with catalog part numbers will be given priority during busy times

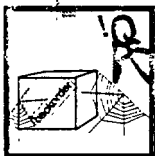
If you need rush shipping service please tell the salesperson before you place the order.



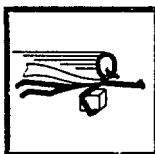
**Ordering by fax:** Please include your customer account number and return fax number. Your account number can be found on the mailing label of this catalog and the *Quick Releases*. Catalog part numbers must be used. Your order will be entered and we will confirm stock status and current prices by return fax, if your fax line is available. Due to our improved order processing time, changes to rush orders may not be possible.



We adhere to a **\$75.00 minimum order** requirement. A \$3.00 service charge will be applied on orders which fall below the minimum. The minimum order requirement will be lowered to \$35.00 from October through February. For orders shipped to Canada, the minimum order is \$200.00. A \$10.00 service charge will otherwise be applied.



We usually avoid **backorders** like the plague. Please re-order any zeroed item. If you order by part number, we can inform you of the stock status at the time of your order.



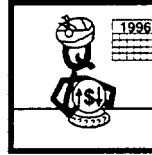
If **speedy shipment** is of the essence, your order can be shipped via UPS 1st or 2nd Day Air or 3 Day Select. Please tell the salesperson your shipping instructions.



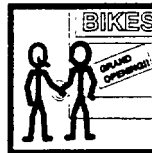
Please keep in mind QBP's **last call** when placing a UPS 1st, 2nd or 3 Day select order. Monday through Thursday, all orders placed before 3:30 p.m. central time will ship that same day. On Fridays, last call is 1:30 pm. All UPS 1st, 2nd, or 3 Day Select orders received after last call will be shipped the following business day



We do not buy any foam packaging but prefer to use **recyclable** crumpled newspaper.



**Prices** will change depending on currency fluctuations and other factors. However, if you order by part number, we can quote you the current prices. Please let the salesperson know if you need price quotes.



New accounts are extended **terms** of COD-Cash. Upon completion of the Customer Inquiry Form, terms are changed to COD-Company Check.

Net terms may be available. Complete a QBP Credit Application which includes four trade references. Please allow as long as 4-6 weeks for approval.

**VISA/MASTER** credit cards may be used for prepayment at the time of order placement. Please have your card #, expiry date, and cardholder name available

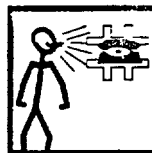


Approved accounts receive terms of net 30 days with payment in full required. All accounts not paid as specified above may be subject to a **finance charge** of 1-1/2% calculated monthly.



In the event your account requires legal action or a collection agency, the fee accrued will be added to your account balance and collected on your next order. The terms of your account will be changed to COD-CASH.

If a check from your company is returned by the bank, a \$15.00 service charge will be added to your account. Also, the terms on your account will be changed to COD-CASH. At the time when the check is replaced, your account terms will be reviewed.



Telephone **(800) 346-0004** for customer service, orders and technical assistance or **(612) 884-7606** if calling from the Twin Cities area.

**(800) 346-8796** for credit and billing information.

Fax **(800) 346-0211** for orders and other correspondence or **(612) 884-8633** from the Twin Cities area.

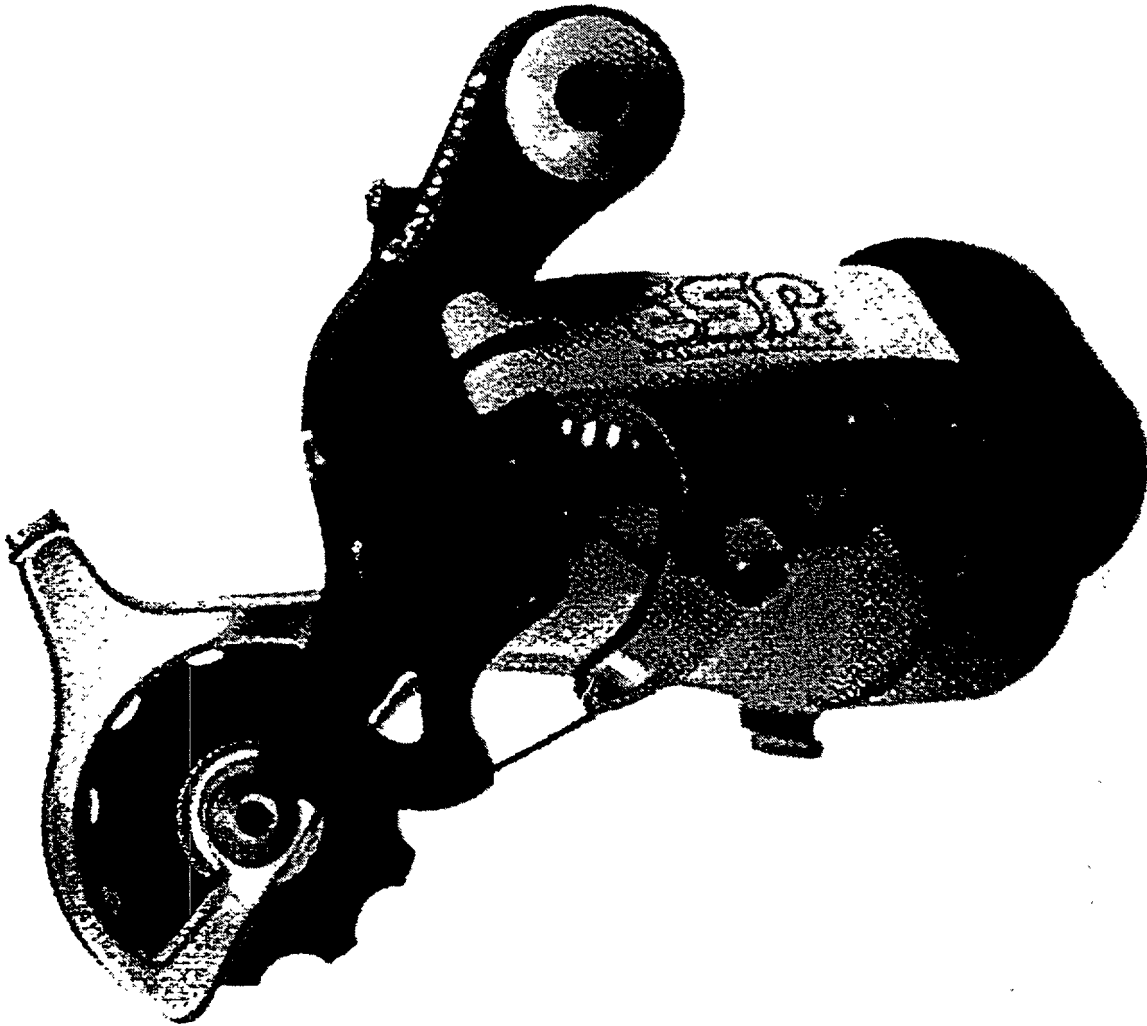


Contact us on CompuServe Mail: 74133,252  
From the Internet: 74133.252@compuserve.com



See **return policies** on the inside of the back cover. QBP's new **free freight** program can be found on page 224. We now offer a subsidized air program.

# Derailleurs: M



Each  
84.95

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8



**QUALITY**

**BICYCLE**

**PRODUCTS**

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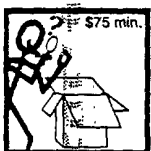
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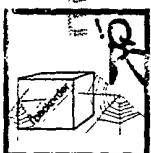
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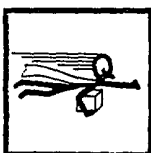
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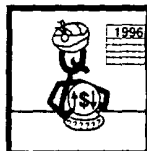
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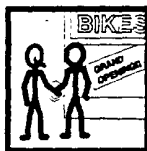
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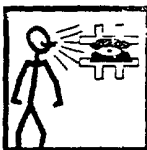


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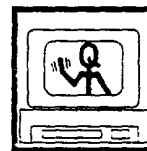
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See **return policies** on the inside of the back cover. QBP's new **free freight** program can be found on page 224. We now offer a subsidized air program.

## Altek

### Shark Fin

- ◆ ② ③ ⑥
- ◆ Large barrel adjuster
- ◆ Ergonomically designed lever blade for comfort
- ◆ Blade is silver, body color is listed below
- ◆ 6061 aluminum, 120 grams **\$78.00**

Silver	Black	Blue	Red
BR4510	BR4513	BR4512	BR4511

## Avid

### Speed Dial original model

- ◆ ① ③ ⑤ ⑥



Shark Fin



